SH3005
HIGH IMPEDANCE DIFFERENTIAL COMPARATOR
FAIRCHILD HYBRID CIRCUITS

GENERAL DESCRIPTION - The SH 3005 consists of a pair of high current gain, matched transistors connected as emitter followers at the inputs of a μA710 comparator.

FEATURES

- **2 MΩ INPUT IMPEDANCE**
- **0.8 μA INPUT BIAS CURRENT**
- **−55°C TO +125°C TEMPERATURE RANGE**

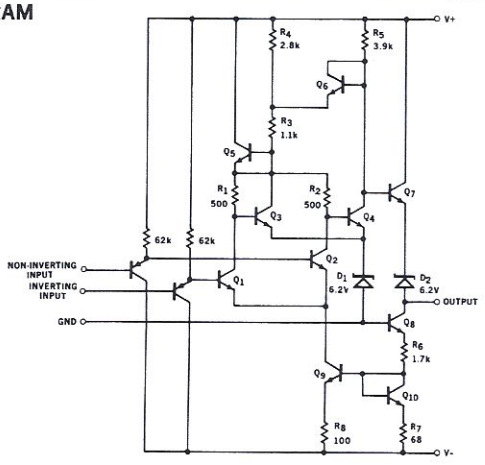
APPLICATIONS

- Variable Threshold Schmitt Trigger
- Pulse Height Discriminator
- High Noise Immunity Line Receiver
- Memory Sense Amplifier

ABSOLUTE MAXIMUM RATINGS (Note 1)

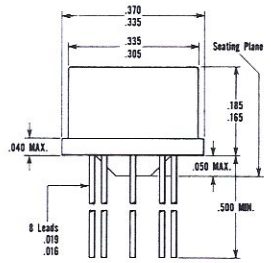
Positive Supply Voltage	+14.0 Volts
Negative Supply Voltage	-7.0 Volts
Peak Output Current	10 mA
Differential Input Voltage	±5.0 Volts
Input Voltage	±7.0 Volts
Internal Power Dissipation	
TO-5 (Note 1)	300 mW
Flat Package (Note 2)	200 mW
Operating Temperature Range	-55°C to +125°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 60 seconds)	300°C

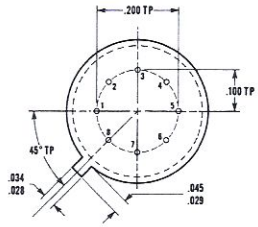
SCHEMATIC DIAGRAM



PHYSICAL DIMENSIONS

(TO-99)





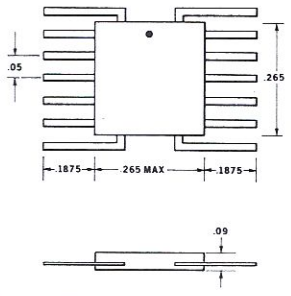
NOTES: Dimensions as per latest J-10 committee
All dimensions in inches
Leads are gold-plated kovar
Package weight is 1.22 grams

PART NO. HXK30051XX: -55°C TO +125°C
PART NO. HXK30059XX: 0°C TO +70°C

PHYSICAL DIMENSIONS

TYPICAL FLAT PACKAGE

TOP VIEW



PART NO. HBG30051XX: -55°C TO +125°C
PART NO. HBG30059XX: 0°C TO +70°C

Notes on page 2
Electrical Characteristics on page 2

313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

FAIRCHILD SEMICONDUCTOR
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ELECTRICAL CHARACTERISTICS (T_A = 25°C, V^+ = 12.0 V, V^- = -6.0 V Unless Otherwise Specified)

Parameter (see definitions)	Conditions	Min.	Typ.	Max.	Units
Input Offset Voltage	V_{out} = +1.4 V, $R_S \leq$ 20 k			7.0	mV
Input Offset Current	V_{out} = +1.4 V		0.3	0.4	μA
Input Bias Current			0.8	2.0	μA
Voltage Gain		750	1500		
Output Resistance			200		
Input Voltage Range	V^- = -7.0 V	±5.0			V
Differential Input Voltage Range		±5.0			V
Positive Output Level	$V_{in} \geq$ 15 mV, 0 $\leq I_o \leq$ 0.5 mA	+2.5	+3.2	+4.0	V
Negative Output Level	$V_{in} \geq$ 15 mV	-1.0	-0.5	0	V
Output Sink Current	$V_{in} \geq$ 15 mV, $V_{out} \geq$ 0	1.6	2.5		mA
Positive Supply Current	$V_{out} \leq$ 0		6.4		mA
Negative Supply Current			5.5		mA
Power Consumption					
TO-5 Package			110	175	mW
The following specifications apply for -55°C $\leq T_A \leq$ +125°C:					
Input Offset Voltage (Note 4)	$R_S \leq$ 20 k			8.5	mV
Input Offset Current (Note 4)				1.0	μA
Input Bias Current				5.0	μA
Temperature Coefficient of Input Offset Voltage (Note 4)			7.0		μV/°C
Voltage Gain		500			

NOTES:

(1) Rating applies for case temperatures to +125°C; derate linearly at 5.6 mW/°C for ambient temperature above +105°C.

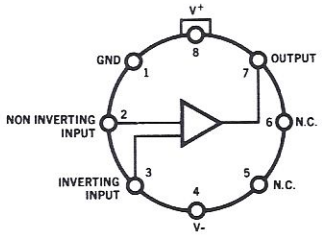
(2) Derate linearly at 4.4 mW/°C for case temperatures above +115°C; derate linearly at 3.3 mW/°C for ambient temperatures above +100°C.

(3) The response time specified (see definitions) is for a 100-mV input step with 5-mV overdrive.

(4) The input offset voltage (see definitions) is specified for a logic threshold voltage of 1.8 V at -55°C, 1.4 V at +25°C and 1.0 V at +125°C.

TO–5 CONNECTION DIAGRAM

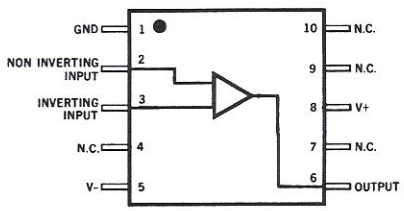
(TOP VIEW)



Note: Pin 4 connected to case

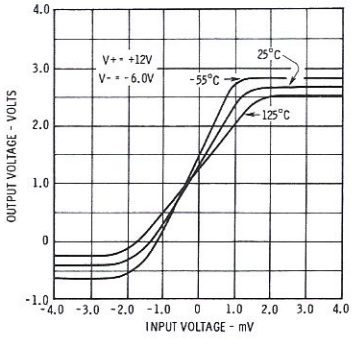
FLAT PACKAGE CONNECTION DIAGRAM

(TOP VIEW)

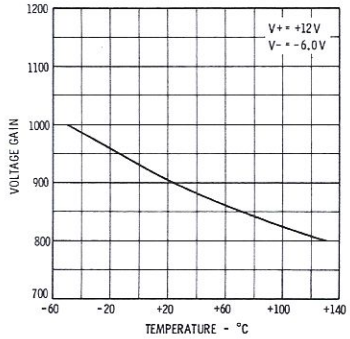


TYPICAL PERFORMANCE CURVES

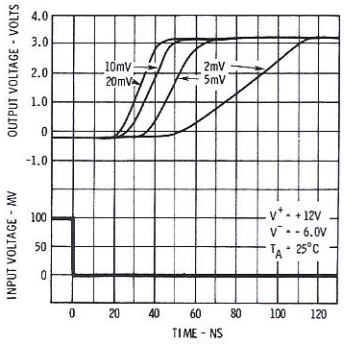
VOLTAGE TRANSFER CHARACTERISTIC



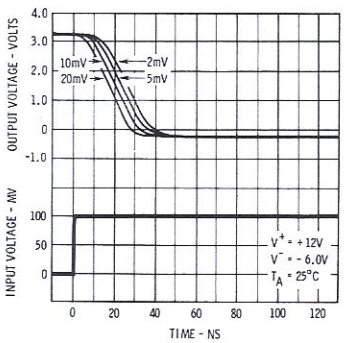
VOLTAGE GAIN AS A FUNCTION OF AMBIENT TEMPERATURE



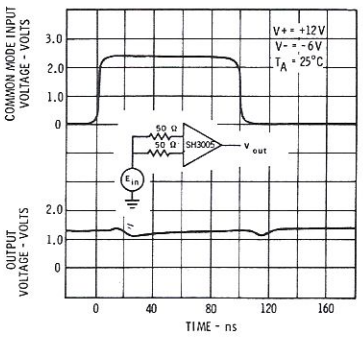
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



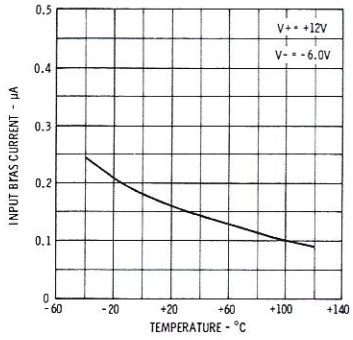
RESPONSE TIME FOR VARIOUS INPUT OVERDRIVES



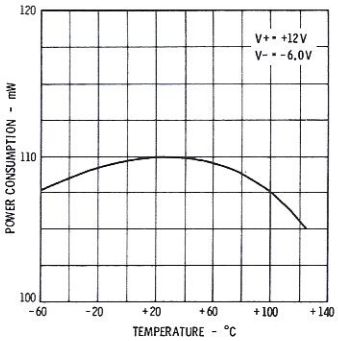
COMMON MODE PULSE RESPONSE



INPUT BIAS CURRENT AS A FUNCTION OF AMBIENT TEMPERATURE



POWER CONSUMPTION AS A FUNCTION OF AMBIENT TEMPERATURE



DEFINITIONS

LOGIC THRESHOLD VOLTAGE - The approximate voltage at the output of the comparator at which the loading logic circuitry changes its digital state.

INPUT OFFSET VOLTAGE* - The voltage between the input terminals when the output is at the logic threshold voltage. The input offset voltage may also be defined for the case where two equal resistances are inserted in series with the input leads.

INPUT OFFSET CURRENT* - The difference in the currents into the two input terminals with the output at the logic threshold voltage.

INPUT BIAS CURRENT* - The average of the two input currents.

INPUT VOLTAGE RANGE* - The range of voltage on the input terminals for which the comparator will operate within specifications.

DIFFERENTIAL INPUT VOLTAGE RANGE* - The range of voltage between the input terminals for which operation within specifications is assured.

VOLTAGE GAIN* - The ratio of the change in output voltage to the change in voltage between the input terminals producing it with the DC output level in the vicinity of the logic threshold voltage.

RESPONSE TIME* - The interval between the application of an input step function and the time when the output crosses the logic threshold voltage. The input step drives the comparator from some initial, saturated input voltage to an input level just barely in excess of that required to bring the output from saturation to the logic threshold voltage. This excess is referred to as the voltage overdrive.

POSITIVE OUTPUT LEVEL* - The DC output voltage in the positive direction with the input voltage equal to or greater than a minimum specified amount.

NEGATIVE OUTPUT LEVEL* - The DC output voltage in the negative direction with the input voltage equal to or greater than a minimum specified amount.

OUTPUT SINK CURRENT - The maximum negative current that can be delivered by the comparator.

PEAK OUTPUT CURRENT - The maximum current that may flow into the output load without causing damage to the comparator.

OUTPUT RESISTANCE* - The resistance seen looking into the output terminal with the DC output level at the logic threshold voltage.

POWER CONSUMPTION - The DC power into the amplifier with no output load. The DC power will vary with signal level, but is specified as a maximum for the entire range of input-signal conditions.

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